

CNC Machining in Durban, South Africa

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Abstract

The ETHOS team travelled to Durban, South Africa to work for Rocket Works, spending the summer improving CNC machines such as wood/metal routers and plasma cutters for the manufacturing side of the company, and used them to manufacture products for various clientele.



Figure 1: Rocket Works Team



Figure 2: CNC Machine

Introduction

- Plasma cutters can experience issues cutting warped pieces of sheet metal
- Repairing CNC machines with old components requires creative solutions
- Modifying computer code in computer assisted manufacturing programs can allow the user to work around hardware weaknesses

Project Description

Wood Router Cutting

- Floor boards had to be cut with warped boards on uneven suction pads
- Adjustments to the g-code allowed for customization of cutting depth based on suction pad height

Brake Pad Clamp Assembly

- A salvaged milling block was installed in Mazak milling machine to raise cutting height
- T-nuts, "V" clamps with handholds and brake pad templates were designed and laser cut

Plasma Cutter Torch Height Control

- Torch was used as mechanical probe to detect cutting surface height
- Spring loaded limit switch installed on torch to allow physical height sensing
- Programmed torch height control based on probing input

Results & Discussion

Wood Router Cutting

- The final rejection rate of cutting the warped boards was 4%, well within the acceptable range of 10%



Figure 3: Floor Boards to be cut

Brake Pad Clamp Assembly

- "V" clamp and brake pad template were laser cut, T-nuts components were assembled, but the full assembly was never tested

Plasma Cutter Torch Height Control

- Torch height control device functioned as intended
- Was never automated in the post-processor

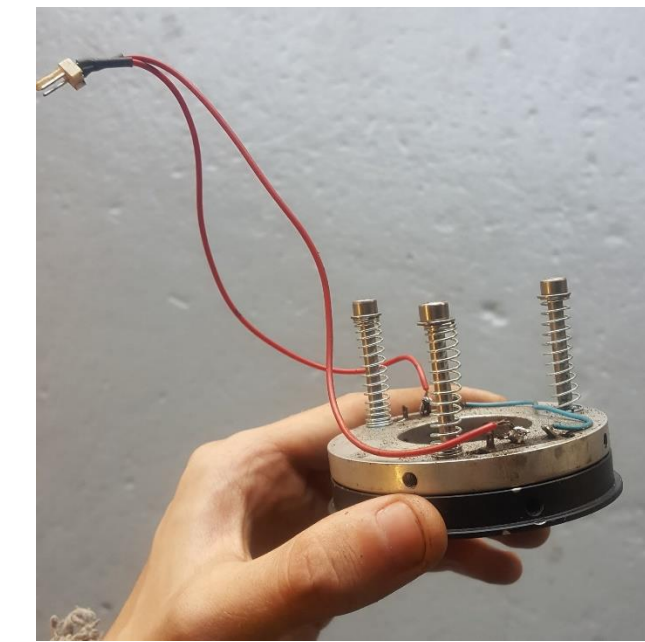


Figure 4: Torch height control switch

Recommendations

- Integrate mechanical torch height control as a default setting in post-processing software
- Run CNC machine through cut path without the tool running once before actual cut
- Never cut costs for components that keep cutting surfaces level
- Ensure that communication with manufacturers and contractors is as clear as possible

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